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ABSTRACT

This training manual provides information needed to meet the minimum EPA standards for certification as a commercial applicator of pesticides in the termite and wood destroying pest control category. The text discusses the importance, description, biology, and control of termites, powderpost beetles, house and warf borers, carpenter ants, and carpenter bees. A study guide with sample and study questions is included. (CS)

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Pesticide Applicator Training Manual

CATEGORY 7B

TERMITES AND OTHER WOOD DESTROYING PESTS

RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

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PESTICIDE APPLICATOR TRAINING MANUAL
CATEGORY 7B

Termites and Other Wood Destroying Pests

A Training Program for the Certification
of Commercial Pesticide Applicators

by

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INTRODUCTION

Wood is manufactured by living trees in a chemical process which uses the sugar produced in the leaves as the basic ingredient. Converting wood (or cellulose) back into sugar can be accomplished within the bodies of only a few species of insects, the most notable being the termites. Some other kinds of insects "eat" wood but cannot convert the cellulose to sugar, and therefore, must get their nourishment from the starch and sugar which the tree had stored in the wood cells. To these insects, the wood itself has no food value and is therefore ejected from their bodies as wood pellets, powder, or "frass." Still other insects such as carpenter ants and carpenter bees, get no food whatever from the wood, and simply excavate holes and cavities in the wood to provide protective shelter for their offspring. The wood particles removed are never swallowed, but simply discarded as completely useless.

It is obviously a matter of good business practice for the applicator to be able to recognize the various forms of damage caused by each kind of wood destroying insect. Moreover, inspections of FHA and VA financed homes require that the presence or evidence of any wood destroying insect be reported. This manual deals exclusively with these insects and their damage as it is usually encountered by the pest control operator.

THE SUBTERRANEAN TERMITE

Importance

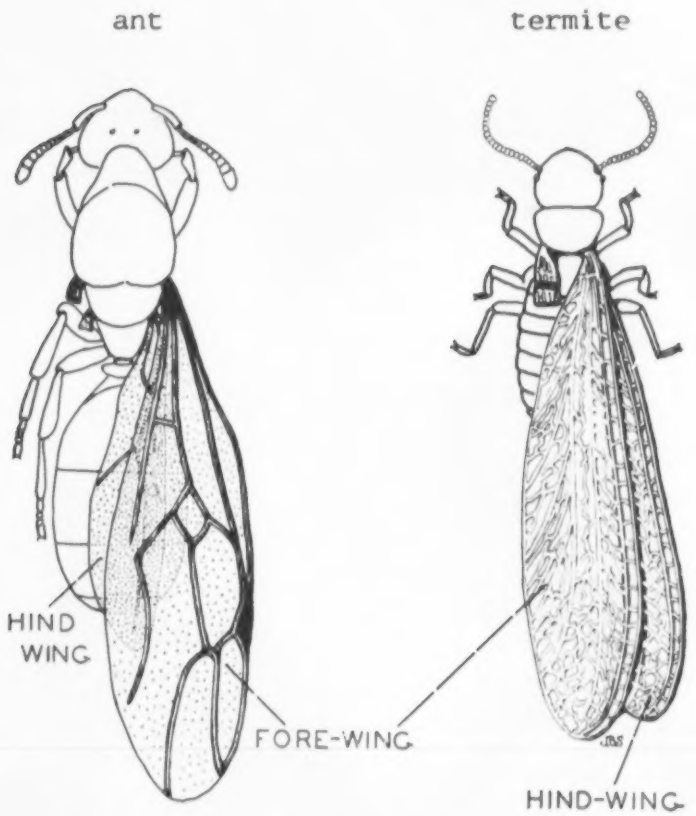
The subterranean termites of the northeastern states are native soil-inhabiting insects which feed on wood, paper, and similar cellulose materials. In forests, termites are beneficial in the fact that they help to decompose fallen trees and stumps and return the wood substances to the soil to be used again by other trees. The economic importance of termite attack on buildings arises from the fact that the wood members of a building closest to the soil, and therefore the most likely to be severely damaged by the termites, are usually the sills, joists, studs, girders, and other important load-bearing elements of construction. Failure to stop termite attack can result in such loss of support that other forms of building deterioration, such as sagging walls and leaking surfaces can follow. Heated buildings whose construction places wood in direct contact with or in close proximity to the soil thus offer termites the ideal environment: a favorable year-around climate and an abundant sheltered food source. Sometimes buildings where wood is placed in close contact with soil, but without heat in the winter, such as barns, stand for decades with no termite attack of any consequence. When such buildings are remodeled into homes, studios, etc., and supplied with heat, serious termite damage often follows in a few years.

Description

The winged reproductive adult (swarmer, alate, flying termite) is the form most often seen by the general public. These

"swarmer termites are dark in color with bodies about 3/8 of an inch long. They have two pairs of very gauzy wings of identical size and shape which extend beyond the body to twice its length. The antennae or "feelers," like those of all termites, resemble a string of little globular beads. Ant colonies

Fig. 1.
Comparison of ant and termite winged reproductives



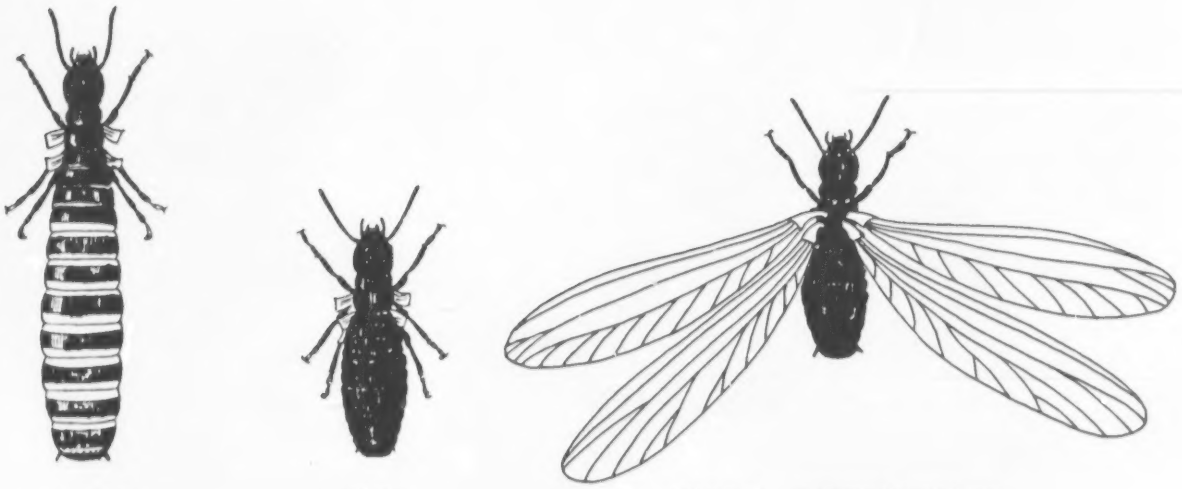
also release winged reproductives (flying ants) which are sometimes mistaken for termites. Fig. 1 illustrates the comparison of ant and termite winged reproductives and the points of difference to be noted appear in the following table.

Characteristics	Ant	Termite
wing size	hindwings much smaller than forewings	both pairs of wings of identical size
wing veins	few, dark, conspicuous veins	very many fine, inconspicuous veins
wing retention	wings remain attached to dead specimens	wings break off soon after emergence in most specimens
*body shape	first 1 or 2 abdomenal segments constricted to form "wasp waist"	no such abdomenal constriction is present
*antennae	antennae usually "elbowed," segments not similar in shape	antennae resemble a string of beads; never "elbowed"

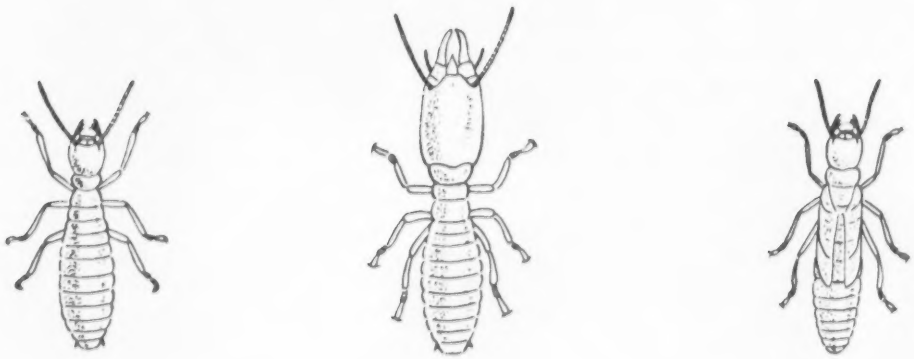
Although the winged reproductive or "swarmer" termite is the form most commonly seen, several other forms or "castes" comprise the majority of the colony. The "worker" caste makes up the bulk of the colony and is the form directly responsible for the damage to wood. Workers are about 1/4 inch long, whitish in color, and soft-bodied. Another form, most often found in larger colonies, is the "soldier" caste whose primary function is the defense of the colony. Soldiers are easily recognized by their large, brownish, well-developed heads and jaws or mandibles. In some very large colonies, another caste called "supplemental reproductives" may be seen. This form is light in color and usually has two pairs of short wing pads.

*These characteristics are also used to separate non-winged forms.

Fig. 2. Termite castes



queen king winged reproductive



worker soldier supplemental reproductive

Biology

General

All termites live in colonies. A colony large enough to produce swarmers consists of thousands of individuals, both growing and mature. In their natural woodland home, without the benefit of man-supplied heat, swarmers normally would not leave the colony until June. Both males and females emerge at

this time and in nature, pair off and fly away to begin new colonies. When infestations occur in heated buildings, large numbers of swarmers may emerge suddenly within the building and such swarms are normally encountered in March or April. Indoors, their usual fate is to die harmlessly within a few days.

All termites begin their lives as eggs produced by a fertilized female or "queen." The young termites hatching from the eggs are called nymphs and are white or pale cream in color, soft-bodied, and blind. They have three pairs of legs and though capable of moving about, must first be cared for by other termites. Later, the nymphs are able to feed on wood and to take care of themselves. When fully grown, most of them do not change in appearance from the nymph. Thus, being blind and soft-bodied, both nymphs and these fully grown workers are well adapted to a soil-inhabiting existence. However, their specializations also require that they live almost constantly in an environment of high relative humidity. It is this single fact of needing to live in an atmosphere of high relative humidity which creates their need for access to the earth. Because of soil moisture, the air spaces between soil particles are almost always very humid, and it is this very humid atmosphere that is so important to the termite colony. Cutting off this "ground contact" with soil moisture is therefore the key principle in termite control. Other sources of moisture such as roof or gutter leaks, defective plumbing, etc., will also serve the termite's needs, but only if sustained over long periods of time.

In a populous colony, some nymphs develop large heads with a hard brown skin and large jaws or mandibles. These individuals are the soldier termites whose sole function is to defend the colony against invasion through its tunnels. Other nymphs develop two pairs of wing pads on their backs and at the final molt to the adult, will emerge as dark colored, winged, reproductives with fully developed eyes. In very large colonies, some of these developing potential reproductives become reproductively mature males and females, but with wing development arrested. These individuals, called "supplemental reproductives," mate within the colony and never leave it. The reproductive needs of such colonies are often taken over entirely by these supplemental reproductives.

Colony History

During the summer months, a mated pair of winged termites can establish a new colony, beginning with the young hatching from the small number of eggs first produced by the female. These nymphs become workers, more young are produced, and thus the the colony grows. However, new colonies can also be produced by a sort of "budding-off" process in which a number of workers and some supplemental reproductives become physically isolated from the original colony. Man's activities, as in digging a cellar or laying a foundation, can bring this about. Thus, when a building is found to be infested with termites, there is usually no sure indication of whether the infestation began as a completely new colony, an isolated fragment of another colony, or whether a colony located nearby, as, for example, in a fence post, simply "moved in" to take advantage

of the year-around warmth of the building. Whether any of these events occurs always depends on the construction of the building, not on the proximity of the termites. Termites live in all soils in the state not subject to constant flooding.

Critical Needs of Termites

We have already seen that a high relative humidity is an absolute necessity for termites. A second critical need is a constant source of food, meaning wood or cellulose. Unlike the carpenter ant, for example, termites cannot hibernate, and thus must continue to feed and be active throughout the winter. The severe cold of winter prevents termites in the woodland from feeding in stumps above ground during much of the winter. Termites did not become a building problem until the 1920's, following a change in house design which put wood in close contact with heated soil.

Maintaining humidity in the termite's feeding cavities is itself a problem of the termite. Masonary and wood absorb moisture. To reduce such losses, termites line their tunnels with salivary secretions that harden to form a moisture-impervious layer. Often, the termites are unable to feed in wall studs at distances more than a few feet from the floor because they are too far from their humidity source. Floor joists also represent an increasing linear distance from the moisture source. To provide more moisture to the joists, termites often construct hanging earthen-lined tubes downward from the joist, but this is usually unseccessful. Crawl spaces that are poorly ventilated often provide an atmosphere of high relative humidity, which permits the joists to absorb moisture

and thus facilitates termite damage.

Termite colonies are remarkably non-combative. It is entirely possible for ants and termites to infest the same building, each producing its winged adults at its appropriate time. Only if the ant colony finds it expedient to feed upon the individuals of the termite colony is there interaction.

Control

It is obvious that any change in the "moisture-temperature-food" complex of a termite colony can profoundly affect its existence. Certain structural changes are particularly important in restricting the colony and these changes will be discussed in the following section.

Mechanical Alteration

Termite damage may be reduced by substituting masonary or metal where wood is in contact with the soil, as in cellar windows. Removing wood from crawl spaces, removing soil against siding, and establishing new grades will also reduce the chances of infestation.

Moisture Correction and Ventilation

Ventilation of space under floors should be provided by grid ventilators in foundation walls if possible. Soil covers are also very effective. Rainwater management and plumbing leaks, while not properly part of a termite control job, should be included in reports. However, both kinds of physical modification are not likely to do more than "inconvenience" a well established termite infestation, and the colony will bend all its efforts to circumventing the inconvenience and in locating

a new route to its food. Because of this, treatment with chemicals is practically always necessary. All visible contacts of wood with soil may be broken in mechanical alteration, but by probing constantly for a new secure route to the wood of the building, the termites sooner or later reestablish themselves and continue the attack.

Chemical Control

The essential concept of control with chemicals is, therefore, to create an impenetrable zone or barrier of soil insecticide between the soil mass on which the termite depends for moisture and the wood of the building to be protected. A successful treatment requires a skillful distribution of the chemical to prevent the colony from finding a single "unprotected" route (free of chemicals) by which its members can go from soil to wood and return. Of course, stating this concept is a simple matter, but establishing or creating such barrier treatments without using excessive amounts of pesticide requires both careful study of the job and skillful application of the chemicals.

Job Plan. The first step in any job should be a study of the building to note those structural features which make it especially susceptible to termite penetration from the soil. Look especially for the following details:

1. Easily penetrated foundations: Walls constructed of stone, concrete, or cinder blocks or hollow tile and brick may develop cracks through which termites can pass within the wall to the sills or other wood members.

2. Earth-filled masonary porches, entryways, and steps:

These structures account for more cases of termite attack than do any other building feature.

3. Slab construction (no cellar excavation): The simple floating slab construction practiced in the 1940's and 1950's is partially duplicated in the more recent designs of split level houses.

4. Wood paneling and other wall finishings: Wood paneling and other finishing on basement walls, wood partition walls, other other wood construction in the basement which extends from masonary to the sills or joists should be checked.

5. Plumbing and utility passages: The entrance of plumbing and utility fixtures through the basement floor and the foundation should be noted.

6. Wells. The presence of wells, whether driven or dug, and their distance from the building must be determined.

7. Springs and sumps: Investigate and record the presence of any springs and sumps which might transport pesticides from the treatment area.

With measurements of foundation dimensions, a sketch or plan should be prepared on which the forgoing points can be noted. The amounts of chemicals to be used in the treatment can later be determined by reference to the job plan.

Treatments along the outside of foundations. The general purpose of the foundation treatment is to create a chemical barrier along the foundation surface and especially to get the chemical into any cracks in the footing. This usually requires trenching to hold the chemical while it is soaking into the backfill against the foundation. Rodding may also be used, as well as pressure pumping, but it should be remembered that aqueous fluids in the soil pass freely up and down, but show

little sideways movement.

Earth-filled porches, terraces, etc. To treat the foundation under these structures, it is customary to drill the surface and introduce the pesticide through the resulting holes. If termite damage in such areas is extensive, it may be necessary to break up the surface, make the necessary repairs, and then treat the backfill thoroughly with pesticide before a new slab is poured.

Treatment along the inside of foundations. Where crawl spaces provide an adequate source of soil moisture, treatment along the inside of such foundations is often necessary, as well as treatment of the soil around any piers or supporting structures in such locations. Also look for utility pipes and conduits from the soil and treat as with piers.

Slabs, finished basements, and partitions. Holes must be drilled through the concrete to provide, by flooding with pesticide, a chemical barrier between the soil and the wood. This wood may be furring strips (supporting dry walls), or complete sill and stud construction, with various kinds of panels as a finished wall.

Treatment around utility lines. Chemical treatments around utility line entrances should be included in a complete job.

Treatment by rodding laterally or horizontally. Sometimes it is it is possible to drill through foundations and insert rods horizontally to provide penetration pathways for chemicals forced into the holes. Any method that will put the chemical where it is needed with the least damage to the property is a

good method.

Wells and cisterns. If wells or cisterns are located near the area of soil treatment, special precautions should be taken. FHA, state, and local regulations should be consulted before applying any pesticide for termite control. As general principles, the following steps are recommended.

- Use mechanical alteration as much as possible. As you know, the effectiveness of such work cannot be taken for granted and frequent inspection is advisable.
- Place increased emphasis on wood treatment.
- Chemically treat only areas near wells and cisterns where the passage of termites from the soil to the building is either known to exist or is highly probable.
- Be especially careful to apply only the amount of chemical needed and slowly enough to let the soil hold it. Avoid flooding and run-off.
- If drilling and treating through a slab, drill more holes and apply smaller quantities of pesticide per hole.

Wood treatment. Various products are sold which are said to penetrate into wood, but it should be remembered that wood is useful to man because it has a natural resistance to penetration (except through the end-grain). Surface treatments are not themselves, therefore, adequate protection against termites. Even pressure-treated wood is easily circumvented by the termites, as they simply construct shelter tubes over the wood surface to afford safe passage.

Wood treatment does have usefulness in at least two specific ways. Infested sills and other wood may contain cavities

harboring large numbers of termites especially winged reproductives. These cavities are often discovered in drilling for wood treatment, so that the soil insecticide can be used to flush the cavity and destroy the termites. If this is not done, the winged reproductives, isolated above ground by the soil treatment, might emerge as a swarm one or several weeks after treatment, leaving the customer believing the job is a failure. Of course, these individuals of "false flight" have nothing whatever to do with the success of the entire job. Secondly, when a well is in close proximity to the area of a foundation treatment and the use of soil pesticide must be limited, wood treatment with "creep emulsions" or gels of appropriate chemicals will provide a valuable back-up to the soil treatment.

There appears to be no way other than the test of time to determine whether a termite job is completely successful. "Test" stakes which have sometimes been driven into the earth around treated buildings are not, unfortunately, a reliable indicator. The termite control operator has the unenviable task of trying to place pesticides judiciously in structural situations through which he/she cannot see. It is a bit like surgery without X-rays. It is all the more important, with today's restrictions on the use of pesticides, that the treatment requirements of a job be thoroughly understood.

Preconstruction treatment. When chemical treatments of the soil associated with a susceptible building under construction can be coordinated with the work of the contractor, a termite

protection job results which is superior to the usual post-construction treatment in two ways. First, all the expensive drilling, altering, and uncertainty of penetration of chemicals attendant to such a job are avoided. More importantly from an environmental standpoint, the pesticide can be used in just the right quantities, with the knowledge that it is going into exactly the right places.

OTHER WOOD DESTROYING PESTS

Other insects "eat" wood, but derive nourishment only from the starch and sugar in it. Unlike termites, these pests do not obtain any nutritional value from cellulose. This group of insects consists of a number of species of beetles whose young or larvae cause damage by tunneling through the wood. Those which attack seasoned and in-service wood are of concern to the pest control operator. The following details are indicative of the work of this group of insects.

1. Wood dust or particles occur in the tunnels or fall from the holes in the wood surface.
2. Holes at the wood surface are circular or nearly so.
3. Larvae in the borings are legless or grub-like.

A further subdivision of these insects can conveniently be made, recognizing the smaller or powderpost beetles, and certain larger forms such as the so-called "old house borer."

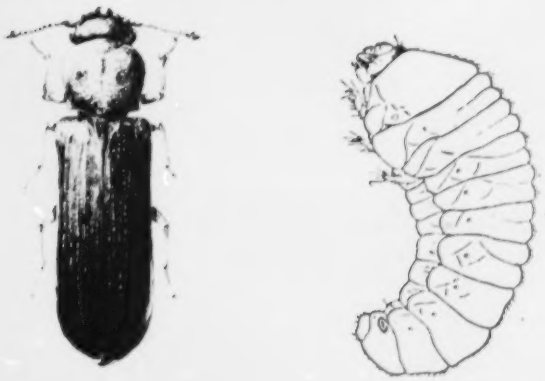
POWDERPOST BEETLES

Description, Biology, and Habits

The larvae of these beetles feed in seasoned wood, leaving

in their tunnels the undigested wood particles in the form of a very fine wood dust or powder, hence the name "powderpost." The adult beetles range from 1/12 to 1/5 inch in length, but as they are rarely seen, their recognition is not important. Rather, it is important to be able to recognize the damage of their larvae.

Fig. 3. A lyctid powderpost beetle



adult larva

The evidence most commonly seen by the pest control operator is the emergence holes in the wood surfaces made by the emerging beetles. These holes range in size, depending upon the powderpost beetle species, from 1/16 to 1/4 inch in diameter. If only a single generation of larvae has fed within the wood, it is usually still structurally sound, but the feeding of generation after generation can reduce the interior of the wood to chiefly a mass of powder. It is this latter citation, often stressed in encyclopedias, which creates panic in the public mind.

An important fact to keep in mind regarding powderpost beetles is simply that before the female will attach her eggs to a piece of wood, she first actually tastes the wood to be sure it contains enough starch and sugar to nourish her offspring. If she is prevented from doing this by a wood coating of <u>any</u> kind (paint, varnish, whitewash, etc.), she will

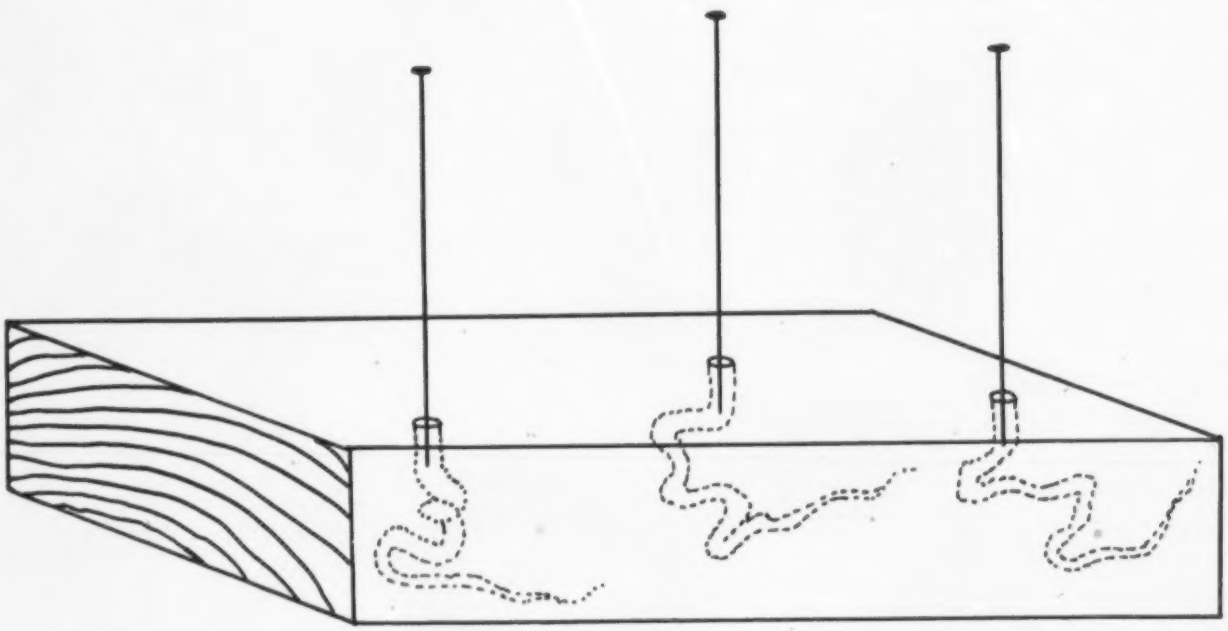
not deposit her eggs and thus the wood, if protected on all surfaces, is not attacked by powderpost beetles.

Let us now consider the chief kinds of powderpost beetle problems encountered by the pest control operator.

Problems in Hardwood Flooring

Floors of recently constructed buildings sometimes show infestations appearing as emergence holes, usually restricted to a few boards in an entire room. If such powderpost beetle emergence holes are probed with a pin or a needle, the hole will be found to be shallow and at right angles to the wood surface. The usual cause of this kind of powderpost beetle

Fig. 4. Powderpost beetle emergence holes in wood



Note: pins perpendicular to wood surface and shallow penetration.

infestation was the inadvertant use of one or two pieces of infested flooring lumber when the floor was laid. Probably the wood received its infestation in the warehouse through being held in storage too long, but if no emergence from the flooring lumber had taken place when the floor was laid, there was no way of knowing that a particular piece was infested. Prevention is therefore a matter of better warehouse management.

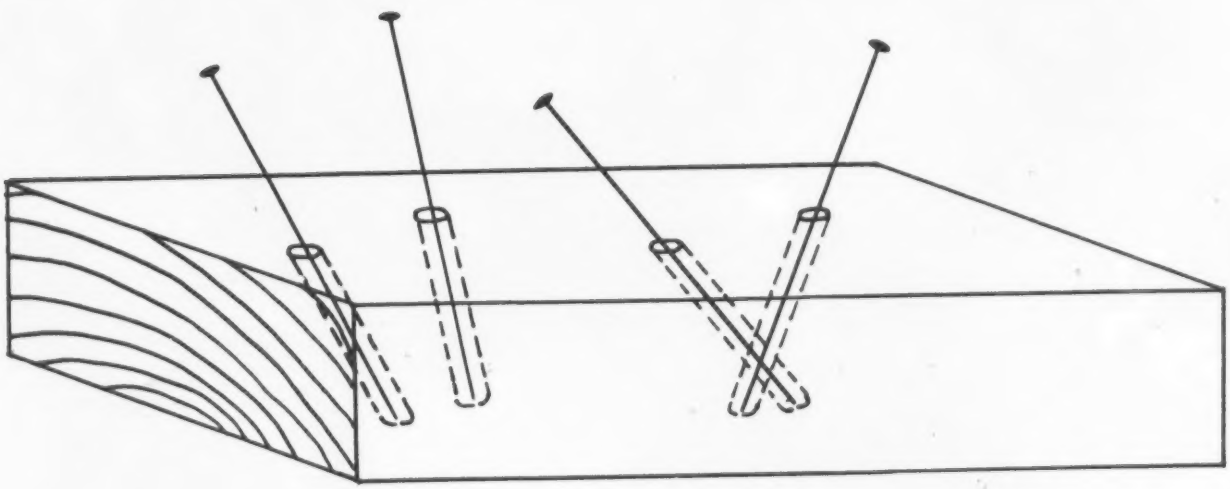
Fortunately, only the single generation of powderpost beetles will emerge, as the presence of floor fillers, varnishes, and waxes prevent further deposition of eggs. No pesticide treatment can do any good whatsoever, and there need be no fear that emerged beetles will attack the structural members of the building. This is so because the beetle species which feed in such hardwoods as oak or maple do not attack such coniferous wood as spruce or fir. However, very old hardwood furniture on which the finish has become weak or perhaps been stripped, can be attacked.

A group of beetles commonly called pinhole worms and ambrosia beetles sometimes construct larval tunnels clear of frass in hardwoods of dying or recently felled trees. When such trees are cut into lumber, as for hardwood flooring, the plane of the sawcut exposes these tunnels at the surface as a variety of small holes closely resembling the emergence holes of powderpost beetles. A limited number of such holes is permitted by grading rules in some classes of hardwood flooring. However, when such a floor is sanded and finished, the sander is likely to cause such holes to become packed with its wood dust. The sealer and finishes which are then applied "seal in"

the wood dust, making the hole completely invisible to ordinary inspection. Only years later, after the sealing materials have broken off, does the hole "suddenly appear" with wood dust coming from it. Often, this is interpreted as evidence of activity but there are no insects.

To distinguish this condition from powderpost beetle damage, probe the holes with a pin or a needle. If the holes were caused by pinhole worms or by ambrosia beetles, the pins will enter much more deeply and at a variety of angles to the floor surface. Of course, as no insects are present, no pesticide treatment can accomplish anything.

Fig. 5. Wood with borings of pinhole worms and ambrosia beetles



Note: oblique angles of pins inserted in burrows and generally deep penetration of pins.

Problems in Very Old Buildings

Pest control operators are sometimes called to treat supposed infestations of powderpost beetles in the structural members (sills, joists, girders, etc.) of old houses. Here, the presence of an abundance of emergence holes from which wood dust is falling is being interpreted as evidence of an active infestation. In almost every case, the supply of starch-and-sugar-containing sapwood was exhausted by the beetles, and the infestation has died off more than a century ago. Only the heartwood, devoid of starch and sugar, is intact and carrying the weight of the house (as it was intended to).

To determine whether there actually is an active infestation, examine 100 holes at random. Look for any that are "fresh" or "clean," like a fresh sawcut, not darkened or discolored from long exposure to the air. If there is an active infestation, the prevention of reinfestation by coating the wood with a non-toxic, permanent surfacing material is the best approach.

Problems in Furniture and Other Manufactured Articles

It is sometimes important to prevent the emergence of powderpost beetles to avoid the disfiguring holes in valued articles. If the item is small enough, or if it can be easily disassembled, confinement in a freezer with temperatures near 0^{o} F is often the surest way of destroying the pests. Articles of tropical origin can be rid of the insects within a few days by this method, but our native species of powderpost beetles are remarkably cold hardy and require longer periods of exposure to these temperatures. No chemical treatment other than

vault fumigation is likely to penetrate in lethal quantities to prevent emergence.

THE OLD HOUSE BORER

Description, Biology, and Habits

The common name of this insect can be completely misleading in the inference that attack on old houses is characteristic of it. It is by no means so restricted, being as likely to attack suitable timbers in recently constructed houses. The old house borer requires the seasoned, wide-grain wood of such softwoods as pine, spruce, and fir, available in a wood surface to which no paint or other permanent finish has been applied.

Fig. 6. The old house borer

The adult beetles range in size from 1/2 to 1 inch in length, but like the powderpost beetles, are rarely seen. Like the powderpost beetles, the larvae of this beetle excrete into their tunnels the wood particles or frass from which they have extracted the starch and sugar. Extensive excavation along the grain results, leaving only a very thin "shell" of the original wood surface held in place by a few solid remnants of the wood interior. Sometimes the frass is so densely packed that it forms a cake. The emergence holes of the adult beetles are often surprisingly few in number, considering the extent of damage, and are slightly oval and 1/4 inch or less in

diameter.

An old house borer infestation often continues over several decades or more. A single individual may average from 3 to 10 years in development to the adult beetle. Thus, the conspicuous damage is most likely to occur in attics and other areas only infrequently examined. However, an infested piece of wood is sometimes used in building a new structure, and the emergence holes of the adult beetles may then appear at the surface of such materials as hardwood, plaster, drywall, and other hard and unlikely substances.

Control

Where a continuous, "ongoing" infestation is found to exist, control is also usually a long-range project. If the affected timbers still have the structural strength to carry the load imposed, the application of permanent, non-toxic surfacing materials, plus the closing of the emergence holes with plugs of injectable caulking material will prevent reinfestation. Annual inspection to close any new holes is necessary.

THE WHARF BORER

Description, Biology, and Habits

The larvae of this beetle feed in water-soaked wood and probably are nourished also by wood-rot decomposition products. As their common name implies, they are associated with serious damage to wharf pilings and other structures such as oil storage tanks supported on pilings in areas of a high water table. Usually the pest control operator encounters the wharf borer as a nuisance pest in the form of the adult beetles.

The adult wharf borer is yellow to reddish-brown on its upper surface, with a black tip band on each wing cover, which gives it the appearance of having a black "tail." The beetles emerge during the month of June, but live only a few weeks at most, and usually all the adult beetles are dead by the beginning of July. The adults are harmless apart from the nuisance of their presence, which can be very great in a business establishment.

Fig. 7. The wharf borer

larva adult

Such problems have been encountered for many years where old wooden buildings have been razed, with much old timber becoming buried in the old cellars. When a new building, without cellar excavation, is erected on the site, wharf borers emerging into the new structure from the buried wood may reach very great numbers. The beetles fly readily to lights, and may even become a problem at some distance from the original

source.

Control

Depending upon the quantity of buried wood, infestations of wharf borers under such "new buildings" will dwindle and terminate in time, but no definite time period can be given. If urgency requires immediate control, a drill and inject treatment through the slab with termite control pesticides offers the best hope.

Another group of insects damage wood by excavating cavities in wood to provide shelter for their offspring. These insects do not obtain any nourishment from the wood. The black carpenter ant and the carpenter bee are the two most important pests in this group.

THE BLACK CARPENTER ANT

Description, Biology, and Habits

This tree-inhabiting ant has workers which are 1/4 to 1/2 inch in length and glossy black in color. It is a native insect which occurs throughout the state. It excavates cavities in stumps and trees to provide shelter for its young and the queen ant, but it will also utilize wood members of buildings, especially when a cavity or enclosed space already exists. Although perfectly sound wood can be attacked by the carpenter ant, it often begins its excavations in water-softened or "punky" wood. Often, these cavities are enlarged to the point of becoming structural problems, but more often the movement of foraging ants within the building becomes objectionable. This may be true even when the indoor-nesting ants are doing

all or most of their foraging outdoors. They may travel or "forage" distances of several hundred feet.

Fig. 8. Castes of the black carpenter ant

queen

female

male

winged reproductives

major worker

minor worker

Control

Often, the wood destroying activity of the colony is betrayed by the litter of large wood particles brought by the gnawing ants to the most convenient opening for discarding. This opening is the place at which to concentrate pesticide treatment. However, if no wood fragments are being discarded, it often requires keen observation to discover where the point of entry to the nest is located. Pesticide dusts have generally been most effective in destroying the ants.

THE LARGE CARPENTER BEE

Description, Biology, and Habits

Fig. 9. The large carpenter bee

These insects are large, robust bees about an inch in length and similar in appearance to the bumble bees. They differ in the fact that the top of the abdomen of the carpenter bee is shiny black in color, there being no covering of hairs as in the bumble bees. They are active throughout the summer months.

After the female bee has mated, she finds a suitable nesting site such as an exterior wood surface of a building. Her choice may be siding, trim, or any wood member which extends nearly horizontally. After excavating a shallow entrance tunnel about 1/2 inch in diameter, she begins to excavate two lateral tunnels along the grain of the wood. When these tunnels

are up to 14 inches long, she secretes wax to form a lining to the end of the tunnel and there fashions a wax cell. In this cell she deposits honey which she makes from nectar, and pollen, both gathered from blossoms. A single egg is laid with the honey and pollen, and the cell sealed with wax. This cell-forming and stocking process is followed until the tunnel is a series of such cells, each containing an egg. When all this is done, the entrance is sealed with wax and the female begins a new excavation nearby. The adult bees, both males and females, emerge the following summer.

Control

When carpenter bees find a building with wood they prefer, large numbers of them attack the building year after year, but there is no colony, only individual females, each going about her own work. Thus, the pest control operator can do control work without fear of alarming an entire colony, as with the yellow jackets and hive bees. Also, the carpenter bee practically never stings. Continued damage by carpenter bees can result in loss of siding and trim, with extensive weather damage to the building.

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TERMITES AND OTHER WOOD DESTROYING PESTS

STUDY QUESTIONS FOR COMMERCIAL PESTICIDE APPLICATORS

Office of Pesticide Applicator Training

COOPERATIVE EXTENSION SERVICE / COOK COLLEGE

COORDINATED AND EDITED

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INTRODUCTION

This category Study Questions Leaflet is for the use of the commercial pesticide applicator preparing for certification as required by federal and state pesticide regulations. The main objective in providing this publication to pesticide users and applicators is to insure the proper and safe use of these chemicals. By putting to use the best technology in applying pesticides we know significant benefits are possible for the applicator as well as the environment. Greater economy, more efficiency in pest control, less risk of hazards, and less time needed in the application of pesticides are some of the benefits available to applicators participating in training for certification.

The multiple choice and true-false questions relate to the main points in the category area of pesticide application and should be studied with reference to the Pesticide Applicator Training Manual. Study and complete each chapter before going to the next. Answer the Category Study Questions by choosing the best answer. Refer to the key for the correct answers.

The following suggestions may be helpful in the study of these Category Study Questions and associated Pesticide Applicator Training Category Manual:

1. Try to be in a positive frame of mind that these materials can be of considerable help to you.

2. Pick a quiet place to study and a time when two or more chapters can be studied at one sitting.

3. Do not memorize. Try to understand the idea and/or principle back of each question.

4. Additional help is as close as your telephone. If you do not understand some questions, your County Agents, specialists, fieldmen, and others may be able to help. Sign up for a training session for pesticide applicators.

5. Do not cram. Choose regular times for study.

6. A training school may be available in your county or area. Call your county extension office for information.

7. Relax and be confident when you take the exam.

CERTIFICATION CAN BE THE STAMP OF PROFESSIONALISM IN YOUR WORK

TERMITES AND OTHER WOOD DESTROYING PESTS

1) In New Jersey the subterranean termite is the only termite of economic importance. T( ) F( )

2) All castes of termites avoid light. T( ) F( )

3) Termite swarmers may have a flight most any time during the year. T( ) F( )

4) Termites are only a problem in soft woods such as pine. T( ) F( )

5) Even a small crack in a concrete basement floor will allow termites to enter a building. T( ) F( )

6) Wood can be left in contact with the soil as long as it is not on the outside of the foundation. T( ) F( )

7) Termites can construct free standing tubes. T( ) F( )

8) If a subterranean termite infestation is found, it is very important to treat the premises immediately. T( ) F( )

9) Proper ventilation alone will prevent termite infestations. T( ) F( )

10) When using a sub-slab injector, the applicator should try to hit heating ducts so the pesticide can be more easily distributed. T( ) F( )

11) Unlike ants, termite swarmers have: a( ) b( )
    a. straight antennae and narrow "waists."
    b. broad "waists" and two pair of similar wings. c( )
    c. elbowed antennae and compound eyes.

12) Subterranean termites need soil contact for: a( ) b( )
    a. warmth during the winter.
    b. moisture. c( )
    c. establishing a nest.

13) Finding mud in infested wood usually indicates the presence of: a( ) b( )
    a. termites. c. either a or b. c( ) d( )
    b. carpenter ants. d. neither a nor b.

14) Subterranean termite mud tubes are always constructed from the ground upward. T( ) F( )

15) All swarmer termites inside the house must be destroyed in order to prevent infestations from beginning in other parts of the house. T( ) F( )

16) Crack and crevice treatments are effective in controlling termites. T( ) F( )

17) A reliable way to distinguish swarmer termites from flying ants is by: a( ) b( )
   a. the number of wings. c( ) d( )
   b. the shape and size of the wings.
   c. the difference in color
   d. the time of year when they appear.

18) Besides the absence of wings, nymph and worker termites can easily be recognized by the fact that they: a( ) b( )
   a. are whiteish and soft-bodied. c( )
   b. are found around the entrance to the colony.
   c. have enlarged heads.

19) When destroying the original king and queen of a termite colony: a( ) b( )
   a. you ruined your chances for doing an expensive job. c( ) d( )
   b. the other members of the colony become helpless and leave to join another colony.
   c. other members of the colony take over the role of reproduction.
   d. the colony must wait for a "spare" king and queen to arrive from a neighboring colony.

20) If the customer informed you of natural springs around the foundation of his/her home: a( ) b( )
   a. the practice of rodding would be more effective since the spring would help carry the chemicals. c( )
   b. rodding should <u>not</u> be done.
   c. no control program should be attempted.

21) Termite control chemicals <u>properly</u> applied under or around a structure do not contribute significantly to the contamination of the environment because: a( ) b( ) c( )
   a. the chemicals move very little from the area of placement.
   b. very few houses in New Jersey need termite control.
   c. the chemicals used are not hazardous.

22) A termite swarm shortly following insecticide treatment often indicates: a( ) b( )
   a. the job was improperly done. c( )
   b. the job was probably successful.
   c. another colony is present.

23) Pressure treating of plates or joists: a( ) b( )
   a. is sufficient to prevent termites from entering a building. c( )
   b. is unlawful unless recommended on the labeling.
   c. is of little value in any termite job.

24) A termite infestation through a dirt filled porch can be controlled by: a( ) b( )
   a. injecting chemicals into the soil beneath the porch. c( )
   b. removing the soil from beneath the porch floor.
   c. both a and b.

25) For termite control, the soil beneath a slab may be satisfactorally treated by: a( ) b( )
   a. drilling through the top of the slab. c( )
   b. rodding laterally from the outside.
   c. either of the above.

26) In FHA and VA financed homes it is required that the applicator report: a( ) b( )
   a. all wood-destroying insect infestations. c( )
   b. only termite infestations.
   d. all insect pests.

27) To avoid subterranean termite problems, the surest way of keeping termites out of a building is by: a( ) b( )
   a. pretreatment during construction. c( )
   b. making sure the structure is well supplied with termite shields.
   c. backfilling the foundation with old lumber to provide an alternate food source for the termites.

28) FHA, State, and local regulations should be consulted before applying insecticides for termite control near a well. T( ) F( )

29) The main purpose of a good termite inspection report is to: a( ) b( )
   a. provide data for an instruction work sheet for doing the control work. c( )
   b. make a good impression on the customer.
   c. relieve the applicator of all responsibility.

30) When performing a termite control job, the <u>most</u> important consideration is: a( ) b( )
   a. completing the job at a reasonable profit. c( ) d( )
   b. the reputation of the applicator.
   c. the safety of all persons involved and the environment.
   d. killing the termites at any cost.

31) Test stakes used to check for termite activity after treatment: a( ) b( )
   a. are unreliable.
   b. are a useful reinspection tool. c( )
   c. should be checked every 2 years.

32) Killing the swarmer termites in the house: a( ) b( )
   a. is not necessary since the swarmers always leave the residence to mate and set up new colonies. c( )
   b. will prevent other parts of the house from becoming infested.
   c. will eliminate the need for further treatment since without swarmers, the colony will die out.

33) Both ant and termite colonies may be found in the same building. T( ) F( )

34) If you discovered mud tubing on the foundation of a house in New Jersey the pest is: a( ) b( )
   a. Formosan termites. c. dry wood termites. c( )
   b. subterranean termites.

35) The principle source of food for termites is: a( ) b( )
   a. small, soil inhabiting insects.
   b. soil bacterial. c( ) d( )
   c. wood.
   d. kitchen scraps.

36) The presence of termite swarmers usually indicates: a( ) b( )
   a. the colony has reached a good size and is ready to expand. c( )
   b. the termites have eaten all the wood they can so you should consider selling your house.
   c. nothing since termites swarm just about every month during the summer.

37) In general, termites are beneficial insects because they help break down dead wood in forests and only become a pest when they attack man-made structures. T( ) F( )

38) Which of the following is <u>not</u> a basic procedure in controlling termites in the house? a( ) b( )
   a. soil treatment c. foundation treatment c( ) d( )
   b. wood treatment d. biological control

39) Throughout the United States, powder post beetles are of little economic importance. T( ) F( )

40) Like termites, the powder post beetles prefer decaying wood. T( ) F( )

41) The presence of any amount of "frass" (sawdust like material) is <u>always</u> positive proof of a current powder post beetle infestation. T( ) F( )

42) The presence of $\frac{1}{4}$", oval exit holes, usually in soft wood, is an indication of an old house borer infestation. T( ) F( )

43) Old house borer infestations are seldom found in new homes. T( ) F( )

44) The shape, color, and angle of exit holes of wood infesting insects are good indicators of whether or not a recent infestation has occurred. T( ) F( )

45) Unlike those of termites, carpenter ant galleries are free of mud. T( ) F( )

46) The main principle in preventing termite infestations is: a( ) b( )
a. injecting chemicals into the nest.
b. injecting chemicals into the wood. c( )
c. putting down a chemical barrier in the soil through which the termite must pass.

47) Wharf borers feed in: a( ) b( )
a. wet, soggy wood. c. both of the above.
b. dry wood. c( )

48) The presence of carpenter bees may be determined by locating: a( ) b( )
a. paper nests hanging from eaves. c( )
b. $\frac{1}{2}$" diameter holes "drilled" in overhangs and siding.
c. a number of holes in a lawn.

49) The major problem with large numbers of carpenter bees is that they: a( ) b( )
a. will attack and sting people without reason. c( )
b. may weaken wooden structures by their nest building.
c. transmit several plant diseases.

50) Carpenter bee is another name for bumble bee. T( ) F( )

51) Which one of these ants causes structural damage? a( ) b( )
a. pavement ants c. yellow ants
b. carpenter ants d. pharoah's ants c( ) d( )

52) For complete control of ants, it is usually necessary to destroy the nest. T( ) F( )

53) The most effective chemical approach in controlling carpenter ants is the use of: a( ) b( )
a. baits. c. space sprays. c( ) d( )
b. residual sprays. d. dusts.

54) Carpenter ant nests are often found in wood that has been damaged by water leakage. T( ) F( )

55) Carpenter ants nest in logs and stumps as well as wall voids and hollow doors. T( ) F( )

56) Carpenter ants: a( ) b( )
a. may travel hundreds of feet from the nest.
b. stay within 50 feet of the nest. c( )
c. seldom travel more than 10 feet.

57) Carpenter ants will not attack dry and hard wood. T( ) F( )

58) Which species of ant does <u>not</u> attack wood? a( ) b( )
a. carpenter ant c. lined acrobat ant
b. pavement ant c( )

KEY

1.	T	16.	F	31.	a	46.	c
2.	F	17.	b	32.	a	47.	a
3.	T	18.	a	33.	T	48.	b
4.	F	19.	c	34.	b	49.	b
5.	T	20.	b	35.	c	50.	F
6.	F	21.	a	36.	a	51.	b
7.	T	22.	b	37.	T	52.	T
8.	F	23.	b	38.	d	53.	d
9.	F	24.	c	39.	F	54.	T
10.	F	25.	c	40.	F	55.	T
11.	b	26.	a	41.	F	56.	a
12.	b	27.	a	42.	T	57.	F
13.	a	28.	T	43.	F	58.	b
14.	F	29.	a	44.	T		
15.	F	30.	c	45.	T		